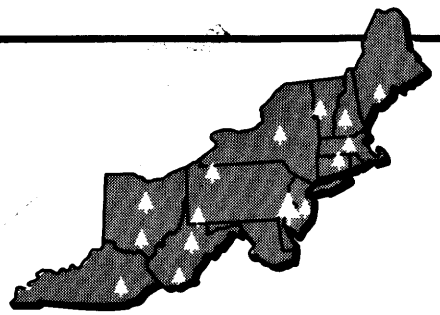
FOREST SERVICE RESEARCH NOTE NE-247
1977

Northeastern Forest Experiment Station



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ODC 377.2

A HYDRAULIC ASSIST FOR A MANUAL SKYLINE LOCK

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Abstract.—A hydraulic locking mechanism was designed to replace the manual skyline lock on a small standing skyline with gravity carriage. It improved the efficiency of the operation by reducing setup and takedown times and reduced the hazard to the crew.

Two hydraulic cylinders provided the solution to a problem in the cable locking mechanism of a skyline logging system that we are evaluating for harvesting Appalachian hardwoods.

The URUS system, manufactured by Reinhold Hinteregger Company of Villach, Austria,[1] is a small standing skyline with a gravity carriage. The carriage and load of logs are pulled up the skyline by a winch; the empty carriage then returns by gravity. Because the system can reach 1,000 feet down the side of a mountain, logging roads can be placed 1,000 feet apart, which reduces their impact on the forest.

As manufactured, the URUS system uses a manual lock to hold tension on the skyline. Two steel wedges clamp the cable between them. Their narrower ends are toward the load so that as the load increases the clamping force on the cable increases. To lock them, a crewman had to climb the 28-foot tower and drive the wedges out with a hammer.[2] To unlock them he had to climb the tower again and drive the wedges in against the tension on the cable. Several times the lock stuck and once the jammed cable tore the clutch face from the clutch plate on the engine, causing lengthy downtime.

To overcome this problem, we added two hydraulic cylinders to the skyline lock so that the locking wedges could be locked and unlocked from the ground. It is still necessary to climb the tower to tighten or loosen the clamping bolts, because we do not want to depend on hydraulic pressure to hold the cable in place after it is locked—there is a possibility that the hydraulic fluid might leak and allow the lock to slip. But the hydraulic locking device has reduced setup and takedown time by 30 minutes and reduced the hazard to the crew.

[1]The use of a trade, firm, or corporation name in this publication is for the information and convenience of the reader. It does not constitute an official endorsement or approval by the Forest Service or the U. S. Department of Agriculture of any product or service to the exclusion of others that may be suitable.

[2]1,000 feet = 304.8 meters
28 feet = 8.5 meters

We chose two double-acting cylinders with a travel of 3-1/8 inches, a pushing capacity of 17,670 lb each, and a pulling capacity of 9,280 lb each. They are rated at 10,000 lb/in^2 hydraulic pressure. The pressure is generated by a two-stage hand pump and delivered to the cylinders by hoses.[3]

Since unlocking the cable requires more force than locking it (because the load on the cable tightens the lock), we mounted the cylinders with their shafts toward the rear of the lock and fabricated a U-shaped yoke to connect them to the wedges (Fig. 1).

The total cost of parts and material was $869.47. Two man-days of labor were required to build and install the device. The only trouble we have encountered was leakage of hydraulic fluid at the quick disconnects on the pump; this was overcome by replacing the O-ring.

[3] 3-1/8 inches = 7.9 centimeters
17,670 pounds = 8,015 kilograms
9,820 pounds = 4,454 kilograms
10,000 pounds = 4,536 kilograms

Figure 1.—Hydraulic skyline lock. The skyline cable is clamped between the two wedges in the center. The original manual lock was modified by addition of two hydraulic cylinders, one on each side, and the yokes and crossbars that connect them to the wedges. The bolt at the extreme right is one of a pair used to lock the cable after it has been adjusted.